Space Weather Forecast

Issued on Friday, 05 May 2023 at 13:13 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: R1-R2 blackouts expected throughout with a slight chance of R3 Strong radio blackouts. G1-G2/Minor-Moderate Storm conditions expected Days 3-4 (7-8 May) with a chance of G3/Strong Storm conditions.

Analysis of Space Weather Activity over past 24 hours
Solar Activity: Solar activity has been Moderate, with a Moderate class flare from an active region in the northeast, although this region is not the largest on the visible disc. In total there are six regions on the visible disc, including several large and active regions in the northeast. The remaining regions are relatively small, weak and magnetically simple.

Numerous CMEs (Coronal Mass Ejections) have departed from the Sun over the past 24 hours. Most of these appear far-sided. One faint full halo CME appears on the latest SOHO-Lasco-C2 imagery, analysis of this is ongoing. An earlier full halo CME appears to be associated with the Moderate class flare on 4 May. Both of which are anticipated to have an Earth-directed component. Further analysis will be undertaken to determine if any of the other CMEs leaving the Sun have Earth-directed components.

Solar Wind / Geomagnetic Activity: The solar wind observed has been steady, persisting predominantly at slightly elevated levels and peaking at 469 km/s at 05/0338 UTC. The strength of the solar wind's magnetic field remained weak, with the important north-south component of the magnetic field also weak, and generally negative. Geomagnetic activity was Quiet (Kp 0-2) throughout.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary
Solar Activity: Moderate activity is expected with Moderate class flares, and a slight chance of Strong flares. Significant flares are most likely from AR3293, AR3296 and AR3297 in the northeast. New regions may rotate onto the visible disc from the far side during the forecast period, potentially adding to the chance of significant flares.

Solar Wind / Geomagnetic Activity: At present a CME (Coronal Mass Ejection), associated with a Moderate Class flare on 4 May, is expected to arrive at Earth either late on Day 3 (7 May) or early on Day 4 (8 May). A second CME, may arrive at Earth late on Day 4 (8 May), but there is currently low confidence in detail and analysis remains underway. Connection to a stream of fast winds from a coronal hole is ls possible later today, but is more likely tomorrow (6 May), with additional enhancement from a smaller, weaker coronal hole on Day 2 or 3. Speeds are uncertain, but the combination of high speed streams could reach speeds of 500-550km/s.

Geomagnetic activity is expected to be Quiet (Kp 1-2) today increasing through Day 2 to Unsettled to Active (Kp 3-4). Chance of a G1/Minor (Kp 5) geomagnetic storm occurring later tomorrow ahead of arrival of fast winds from a coronal hole. G1-G2/Minor-Moderate Storm (Kp

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5-6) intervals are likely late Day 3 and into Day 4 due to the expected arrival of CMEs; also a slight chance of a G3/Strong Geomagnetic storm (Kp7) interval.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is most likely to persist at background levels with no solar radiation storms occurring. However count rates may increase with any notable flares that occur, with a slight chance of reaching the S1/Minor Radiation Storm threshold throughout, mainly from the complex regions in the northeast quadrant.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	30	70	70
Strong	G3	No	1	1	20	20
Severe	G4	No	1	1	3	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	70	70
Very Active	R3 to R5 X	No	15	15	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	10	10	15
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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